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EXAMINER

MOORE, IAN N

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/627,366		LEUNG, KENT K.	
	<b>Examiner</b>		<b>Art Unit</b>	
	IAN N. MOORE		2616	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 March 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,3-9,12-23,25-37 and 39-57 is/are pending in the application.  
     4a) Of the above claim(s) 1,3-9,12-23,25 and 41-43 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 26-37,39,40 and 44-57 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election with traverse of Species I, **Claims 26-57** in the reply filed on 3-24-2008 is acknowledged. However, it is noted that claim 38 was previously canceled and claims 41-43 are dependent upon non-elected independent claim 1. Thus, the correct number of claims in elected Species I should be **Claims 26-37 and 39-40, 44-57**.

The traversal is on the ground(s) that the claims would not require separate classification or differently field of search and would not unduly burden the examiner to examine all of the pending claims together.

This is not found persuasive because each specie requires a different field of search (e.g., searching different classes/subclasses or electronic resources, or employing different search queries, *i.e.* 370/338,349,352, 356; 455/403, 432, 433, 435); and/or the prior art applicable to one species would not likely be applicable to another species; and/or the species are likely to raise different non-prior art issues under 35 U.S.C. 101 and/or 35 U.S.C. 112, first paragraph. Since there are different areas of search, it is clear that there is a burden to the examiner to exam all of the pending claims that belong to mutually exclusive characteristics of species.

2. **Claims 1,3-9, 12-23, 25 and 41-43** are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected species, there being no allowable generic or linking claim.

The requirement is still deemed proper and is therefore made **FINAL**.

***Terminal Disclaimer***

3. The terminal disclaimer filed on 12/15/2006 and 11/8/2007 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patent No. 6,195,705 and No. 6,621,810 has been reviewed and is accepted. The terminal disclaimer has been recorded.

***Claim Rejections - 35 USC § 101***

4. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. **Claims 44 and 46-49** are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter since it fails to be limited to embodiments which fall within a statutory category.

**Claim 44** recites, “a **computer-readable medium** storing thereon computer-readable instruction executable by a computer for registering a mobile node ...” in line 1-2.

**Claim 46** recites, “a **computer-readable medium** storing thereon computer-readable instruction executable by a computer for registering a mobile node ...” in line 1-2.

**In specification**, page 19, lines 14-15 recites, as follows:

“**Examples of machine-readable media include, but are not limited to**, magnetic media such as hard disks, floppy disks, and magnetic tape; optical media such as CD-ROM disks; magneto-optical media such as floptical disks”.

**In specification**, page 19, lines 17-20 recites as follows:

“The invention may also be embodied in **a carrier wave** travelling over an appropriate medium such as airwaves, optical lines, electric lines, etc.”

In view of the above, applicant has provided antecedent basis for the claim terminology “computer readable medium”. Applicant has provided intrinsic evidence of embodiments (i.e. “*a computer readable medium*” is the “*a carrier wave*” which is a signal such as “*airwave, optical wave or electrical wave*”) intended to be covered within the meaning.

The covered embodiment is a carrier wave. A carrier wave in the context of this disclosure cover “*air waves, optical waves, electrical wave*”, which are not a Manufacture within the meaning of 101, and electrical connections, optical coaxial cables, copper wire and fiber optics fibers, on which the program is still unavailable to the processor. In such embodiments, the program is still unable to act as a computer component and have its functionality realized. Thus, claims that recite nothing but the physical characteristics of a form of energy, such as a frequency, voltage, or the strength of a magnetic field, define energy or magnetism, per se, and as such are nonstatutory natural phenomena. O’Reilly, 56 U.S. (15 How.) at 112-14. Thus, this embodiment is also non-statutory.

In view of the above analysis, claims 44 and 46 are ineligible for patent protection as failing to be limited to embodiments which fall within a statutory category.

**Claims 47-49** are also rejected since they are depended upon rejection claim 46 set forth above.

### ***Claim Rejections - 35 USC § 112***

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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7. Claims 26, 30, 32, 44, 45, 46, 50 and 54 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

**Claim 26** recites “**a router includes the Foreign Agent and the Home Agent**” in lines 7, and

“thereby enabling packets addressed to the mobile node to be forwarded by Home Agent of the router to the Foreign Agent of the router via **the physical interface**” in lines 7-11, and “forwarding the packet by the Home Agent of the router to the Foreign Agent of the router via **a physical interface on the router**” in lines 14-15.

In view of line 7, both Foreign Agent and Home Agent are embodied on a single router (as in light of FIG. 2 HA/FA). However, in view of lines 7-11 and 14-15, Foreign Agent and Home Agent are communicated via a physical interface on the router. Since a physical interface is used to forward the packet from home agent to foreign agent, both Foreign Agent and Home Agent are embodied on two separate routers. If they were on a single router, there would be no point of using a physical interface for transmission.

Thus, it is unclear whether Foreign Agent and Home Agent are embodied on the same router, or Foreign Agent and home agent are embodied on two different entities/routers.

**Claim 30, 32, 44, 45, 46, 50 and 54** are also rejected for the same reason as set forth above in claim 26.

**Claim 54** recites “a processor” and “a memory at least one of the processor or the memory being **adapted for**” in lines 3-4. Since “adapted for” is an optional language and the claim is only called for a processor and a memory, it is unclear whether the steps that follows “adapted

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for" (i.e. receiving, determining, and etc.) are performing. If these steps were required, it is suggested to revise the claim language such that the steps/functions, which follow "adapted for", to be performed are required (not optional).

**Claim 57** is also objected for the same reason as set forth above in claim 54.

**Claims 27-29, 31, 33-36, 47-49, 51-53, 55 and 56** are also objected since they are depended upon rejected claims 26, 30, 32, 44, 45, 46, 50 and 54 as set forth above.

*Note that for the purpose of the examination, the following prior art rejections are applied based on the best understanding of the applicant claimed invention.*

### ***Claim Objections***

8. Claims 30-45 are objected to because of the following informalities:

**Claim 30** recites "a physical interface" in line 15. For consistency and clarification with "the physical interface" recited in line 10, it is suggested to change "a physical interface" in line to "the physical interface".

**Claims 32, 44, and 45** are also objected for the same reason as set forth above in claim 30.

**Claims 31 and 33-36** are also objected since they are depended upon objected claim 30 as set forth above.

Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 26-31 and 44-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over La Porta (US006434134B1) in view of Ahmed (US006160804A).

**Regarding Claim 26**, La Porta discloses in a router supporting Mobile IP (see FIG. 1, Router R2/R3; FIG. 2, Router R4/R6/Root-Router 150; see FIG. 14, Router R7; see FIG. 17, Router R8 provide Mobile IP; or see FIG. 6, a router in the domain; see col. 4, line 33-36, 55-56), a method (see FIG. 3-4, 16A-B, 17, Method) of registering a mobile node (see FIG. 1, 2, 14, 17, Mobile Device MD 114) visiting a Foreign Agent (see FIG. 2, visiting Foreign Agent R5/R6; see FIG. 14, R7; or see FIG. 17, R8) with a Home Agent (see FIG. 2, with home agent router R4/Root-Router 150; see FIG. 14, R7; or see FIG. 17, R7/Root-router 360); see col. 7, line 22 to col. 8, line 45; see col. 23, line 40 to col. 24, line 20; see col. 27, line 45 to col. 28, line 40), the method comprising:

receiving a registration request packet from the mobile node (see FIG. 6, ingress/receive ports/interfaces 262 of a router in the domain receives path setup message from MD 114; see col. 11, line 58 to col. 12, line 6 see col. 2, line 4-10, 17-30; see col. 5, line 5-15; see col. 7, line 1-20; see col. 8, line 10-45, 64 to col. 7, line 10; see col. 10, line 10-20; receiving), the registration request packet (see FIG. 7, 9, path setup message 300; also see FIG. 14, 17, receiving message 1-2; see col. 23, line 40 to col. 24, line 15; see col. 27, line 60 to col. 28, line 27 ) specifying a



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Home Address (see FIG. 7, 9, includes destination IP address 318) and a care-of address (see FIG. 7, 9, source IP address 316 which is a care of address; see col. 2, line 4-10, 17-30; see col. 5, line 5-15; see col. 7, line 1-20; see col. 8, line 10-45, 64 to col. 7, line 10; see col. 10, line 10-20; see col. 14, line 25-67; see col. 15, line 20-35);

determining (see FIG. 6, processor 266 and memory 268 of a router in the domain performs processing/determining; see col. 11, line 58 to col. 12, line 6) from the registration request packet whether the router includes the Foreign Agent that the mobile node is visiting (see FIG. 6, processor 266 and memory 268 of a router in the domain determines from the path setup message whether the router is the foreign agent that MD 114 is in foreign domain; see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40; also see FIG. 16a-b,) by ascertaining care-of address specified in the registration request packet and an address of the router (see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40; by determining that source IP care of address in the path set up message and the address of the router);

determining from the registration request packet whether the router includes the Home Agent with which the mobile node is registering (see FIG. 6, processor 266 and memory 268 of a router in the domain performs processing/determining from the path setup message whether the domain router is the home agent that MD 114 is registering; also see FIG. 16a-b; see col. 11, line 58 to col. 12, line 6; see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40); and

if it is determined from the registration request packet that the router includes the Foreign Agent the mobile node is visiting (see FIG. 14, 16a-b, 17; the domain router includes foreign

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agent functionality that MD 114 visiting) and the Home Agent with which the mobile node is registering (see FIG. 14, 16a-b, 17, home agent functionality that MD is setting up the connection; note that domain router have both home agent functionality and foreign agent functionality; see col. 7, line 55-69; see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40), registering the mobile node visiting the Foreign Agent of the router (see FIG. 6, processor 266 and memory 268 of a router in the domain performs setup/registering MD 114; see col. 11, line 58 to col. 12, line 6) with the Home Agent of the router (see FIG. 2, 14, 17, with domain router with home agent functionality; see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40); and

receiving a packet addressed to the Home Address of the mobile node (see FIG. 2, 14, 17, receiving a packet with destination/home IP address 318 of the MD) from a corresponding node (see FIG. 2, 19, 20, Corresponding Node CN 110; see col. 4, line 33-42; see col. 33, line 14 to col. 34, line 55) by the Home Agent of the router (see FIG. 2, by home agent functionality of the router 150; see FIG. 14, by the home agent functionality of the router R7; or see FIG. 17, by the router R7 or home agent functionality of the root router 360); and

forwarding a packet (see FIG. 6, processor 266 and memory 268 of a router in the domain performs routing/forwarding IP packet; see col. 11, line 58 to col. 12, line 6) by the Home Agent of the router (see FIG. 2, by home agent functionality of the router 150; see FIG. 14, by the home agent functionality of the router R7; or see FIG. 17, by the router R7 or home agent functionality of the root router 360) to the Foreign Agent of the router (see FIG. 2, to the foreign agent fundability of the router 150; see FIG. 14, to foreign functionality of the router R7; or see FIG. 17, to the router R8, or foreign agent functionality of the root router 360) via a physical

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interface on the router (see FIG. 14, via interface Intf A/B at R7, or root router 360; see FIG. 17, via interface Intf B/A at R7/R8, or root router 360 Intf B/C; see col. 23, line 41 to col. 24, line 29; see col. 25, line 20 to col. 27, line 25; see col. 27, line 45 to col. 30, line 65);

wherein the packet received from the corresponding node (see FIG. 2, 14, 17, the packet received from CN; see col. 4, line 33-42; see col. 33, line 14 to col. 34, line 55) does not identify the physical interface (see FIG. 14, 17, does not indicate/identify the interface Intf on the R7/R8/root router 360; see col. 23, line 41 to col. 24, line 29; col. 25, line 20 to col. 27, line 25; see col. 27, line 45 to col. 30, line 65; also see FIG. 19, see col. 33, line 14 to col. 34, line 55).

La Porta does not explicitly disclose “by ascertaining whether the care-of address specified in the registration request packet is equivalent to an address of the router”.

However, Ahmed teaches in a router (see FIG. 1, 4, network node 104), a method comprising receiving a registration request packet from the mobile node (see FIG. 1, 4, receiving registration request/entry from mobile station 102),

determining from the registration request packet whether the router includes the Foreign Agent that the mobile node is visiting (see col. 15, line 27 to col. 16, line 17; determining registration request/entry whether the network node 104 includes VLR that MS is visiting ) by ascertaining whether the address specified in the registration request packet is equivalent to an address of the router (see FIG. 4, by determining/matching if there is a match to the hose name/address the mobile is visiting by checking host name/address of VLR; see col. 15, line 27 to col. 16, line 17) ;

determining from the registration request packet whether the router includes the Home Agent with which the mobile node is registering (see FIG. 4, determining registration

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request/entry whether network node with which mobile station MS is registration (by HLR SNLA lookup to query HLR location of the mobile); see col. 15, line 27 to col. 16, line 17); and

registering the mobile node with the Home Agent of the router if it is determined from the registration request packet that the router includes the Foreign Agent the mobile node is visiting and the Home Agent with which the mobile node is registering (see FIG. 5A-B, MS sends HLR lookup message to direct network node, and the network node determines if the match exists; if a match exists, there network node directs HLR of corresponding mobile in home directory table and HLR initiates search procedure to locate and register the MS; see col. 13, line 1 to col. 14, line 56; see col. 15, line 27 to col. 16, line 17); and

forwarding a packet by the Home Agent of the router to the Foreign Agent of the router via a physical interface on the router (see FIG. 4, network node 104 includes HLR, VLR, and home directory table; thus the physical interface of the network node 104 enables packets addressed to the home address of the mobile 102 to forward to the VLR via the physical interface identified for the network node 104; see col. 11, line 42-67).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide “by ascertaining whether the care-of address specified in the registration request packet is equivalent to an address of the router” as taught by Ahmed in the system of La Porta, so that it would provide efficient, scalable and flexible communications system capable of handling various application in mobility management techniques as suggested by Ahmed; see col. 3, line 35-50.

**Regarding Claim 27**, La Porta discloses wherein registering the mobile node is performed to reach the mobile node as set forth above in claim 26.

La Porta does not explicitly disclose “without creating a tunnel interface”.

However, Ahmed teaches wherein registering the mobile node is performed without creating a tunnel interface to reach the mobile node (see col. 13, line 5 to col. 14, line 55; in home and visitor location registration, each mobile station is assigned a HLR, which includes mobile host name, unique ID, SNLA, time of entry and expiration time. Each network node maintains a VLR that records information on mobiles that are within its coverage area and have registered with it, thus it is clear that registration is performed without a tunnel interface).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide “without creating a tunnel interface” as taught by Ahmed in the system of La Porta, so that it would provide efficient, scaleable and flexible communications system capable of handling various application in mobility management techniques as suggested by Ahmed; see col. 3, line 35-50.

**Regarding Claim 28**, La Porta discloses wherein registering the mobile node is performed to reach the Home Agent as set forth above in claim 26.

La Porta does not explicitly disclose “without creating a tunnel interface”.

However, Ahmed teaches wherein registering the mobile node is performed without creating a tunnel interface to reach the home agent (see col. 13, line 5 to col. 14, line 55; in home and visitor location registration, each mobile station is assigned a HLR, which includes mobile host name, unique ID, SNLA, time of entry and expiration time. Each network node maintains a VLR that records information on mobiles that are within its coverage area and have registered with it, thus it is clear that registration is performed without a tunnel interface).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide “without creating a tunnel interface” as taught by Ahmed in the system of La Porta, so that it would provide efficient, scaleable and flexible communications system capable of handling various application in mobility management techniques as suggested by Ahmed; see col. 3, line 35-50.

**Regarding Claim 29**, La Porta discloses forwarding the registration request packet to the Home Agent (see FIG. 17, forwarding/routing setup request to the home agent router R7) if it is ascertained from the registration request packet that the router does not include the Home Agent, wherein the Home Agent is external to the router (see FIG. 17, after determining that setup request that R8/root router 360 does not include home agent, and home agent is home agent router R7); see col. 28, line 5 to col. 29, line 7). Ahmed also discloses forwarding the registration request packet to the Home Agent if it is ascertained from the registration request packet that the router does not include the Home Agent, wherein the Home Agent is external to the router (see FIG. 5A-B, initiating mobile sends HLR lookup message to direct network node. Network node checks to determine if a match exist, if no match exists, the direct network node directs HLR of correspondent mobile in home directory table and HLR initiate search procedure to locate the correspondent mobile).

**Regarding Claim 30**, La Porta discloses in a router supporting Mobile IP (see FIG. 1, Router R2/R3; FIG. 2, Router R4/R6/Root-Router 150; see FIG. 14, Router R7; see FIG. 17, Router R8 provide Mobile IP; or see FIG. 6, a router in the domain; see col. 4, line 33-36, 55-56), a method (see FIG. 3-4, 16A-B, 17, Method) of registering a mobile node (see FIG. 1, 2, 14, 17, Mobile Device MD 114) visiting a Foreign Agent (see FIG. 2, visiting Foreign Agent R5/R6;

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see FIG. 14, R7; or see FIG. 17, R8) with a Home Agent (see FIG. 2, with home agent router R4/Root-Router 150; see FIG. 14, R7; or see FIG. 17, R7/Root-router 360); see col. 7, line 22 to col. 8, line 45; see col. 23, line 40 to col. 24, line 20; see col. 27, line 45 to col. 28, line 40), the method comprising:

receiving a registration request packet from the mobile node (see FIG. 6, ingress/receive ports/interfaces 262 of a router in the domain receives path setup message from MD 114; see col. 11, line 58 to col. 12, line 6 see col. 2, line 4-10, 17-30; see col. 5, line 5-15; see col. 7, line 1-20; see col. 8, line 10-45, 64 to col. 7, line 10; see col. 10, line 10-20), the registration request packet (see FIG. 7, 9, path setup message 300; also see FIG. 14, 17, receiving message 1-2; see col. 23, line 40 to col. 24, line 15; see col. 27, line 60 to col. 28, line 27 ) specifying a Home Address (see FIG. 7, 9, includes destination IP address 318) and a care-of address (see FIG. 7, 9, source IP address 316 which is a care of address; see col. 2, line 4-10, 17-30; see col. 5, line 5-15; see col. 7, line 1-20; see col. 8, line 10-45, 64 to col. 7, line 10; see col. 10, line 10-20; see col. 14, line 25-67; see col. 15, line 20-35);

determining from the Home Address and the care-of address specified in the registration request packet whether the router includes the Foreign Agent and the Home Agent (see FIG. 6, processor 266 and memory 268 of a router in the domain performs processing/determining from destination/home IP address and source care of address in the path setup message whether the domain router has home agent or foreign agent functionalities; also see FIG. 16a-b; see col. 11, line 58 to col. 12, line 6; see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40; see col. 36, line 55-60); and

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if it is determined that the router includes the Foreign Agent and the Home Agent (see FIG. 14, 16a-b, 17; if the domain router includes both foreign agent functionality and home agent functionality that MD; see col. 7, line 55-69; see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40), registering the mobile node with the Home Agent such that the care-of address is associated with the mobile node (see col. 11, line 58 to col. 12, line 6; setting up the connection with home agent functionality of router so that source care of address is associated with MD 114), thereby enabling packets addressed to the mobile node to be forwarded by the Home Agent of the router (see FIG. 2, so that packets destination to MD from CN 110 to forward/route by the home agent functionality of the router 150; see FIG. 14, by the home agent functionality of the router R7; or see FIG. 17, by the router R7 or home agent functionality of the root router 360) to the Foreign Agent of the router (see FIG. 2, to the foreign agent fundability of the router 150; see FIG. 14, to foreign functionality of the router R7; or see FIG. 17, to the router R8, or foreign agent functionality of the root router 360) via the physical interface (see FIG. 14, via interface Intf A/B at R7, or root router 360; see FIG. 17, via interface Intf B/A at R7/R8, or root router 360 Intf B/C; see col. 23, line 41 to col. 24, line 29; see col. 25, line 20 to col. 27, line 25; see col. 27, line 45 to col. 30, line 65);

receiving a packet addressed to the Home Address of the mobile node (see FIG. 2, 14, 17, receiving a packet with destination/home IP address 318 of the MD) from a corresponding node (see FIG. 2, 19, 20, Corresponding Node CN 110; see col. 4, line 33-42; see col. 33, line 14 to col. 34, line 55) by the Home Agent of the router (see FIG. 2, by home agent functionality of the router 150; see FIG. 14, by the home agent functionality of the router R7; or see FIG. 17, by the router R7 or home agent functionality of the root router 360); and



forwarding a packet (see FIG. 6, processor 266 and memory 268 of a router in the domain performs routing/forwarding IP packet; see col. 11, line 58 to col. 12, line 6) by the Home Agent of the router (see FIG. 2, by home agent functionality of the router 150; see FIG. 14, by the home agent functionality of the router R7; or see FIG. 17, by the router R7 or home agent functionality of the root router 360) to the Foreign Agent of the router (see FIG. 2, to the foreign agent fundability of the router 150; see FIG. 14, to foreign functionality of the router R7; or see FIG. 17, to the router R8, or foreign agent functionality of the root router 360) via a physical interface on the router (see FIG. 14, via interface Intf A/B at R7, or root router 360; see FIG. 17, via interface Intf B/A at R7/R8, or root router 360 Intf B/C; see col. 23, line 41 to col. 24, line 29; see col. 25, line 20 to col. 27, line 25; see col. 27, line 45 to col. 30, line 65);

wherein the packet received from the corresponding node (see FIG. 2, 14, 17, the packet received from CN; see col. 4, line 33-42; see col. 33, line 14 to col. 34, line 55) does not identify the physical interface (see FIG. 14, 17, does not indicate/identify the interface Intf on the R7/R8/root router 360; see col. 23, line 41 to col. 24, line 29; col. 25, line 20 to col. 27, line 25; see col. 27, line 45 to col. 30, line 65; also see FIG. 19, see col. 33, line 14 to col. 34, line 55).

La Porta does not explicitly disclose that a physical interface is “associated with the mobile node”.

However, Ahmed teaches in a router (see FIG. 1, 4, network node 104), a method comprising receiving a registration request packet from the mobile node (see FIG. 1, 4, receiving registration request/entry from mobile station 102),

determining from the registration request packet whether the router includes the Foreign Agent and the home agent (see col. 15, line 27 to col. 16, line 17; determining registration request/entry whether the network node 104 includes both VLR and HLR);

if it is determined that the router includes the Foreign Agent the mobile node and the Home Agent with which the mobile node, registering the mobile node with the Home Agent of the router such that the address are associated with the mobile node (see FIG. 5A-B, MS sends HLR lookup message to direct network node, and the network node determines if the match exists; if a match exists, there network node directs HLR of corresponding mobile in home directory table and HLR initiates search procedure to locate and register the MS; and registration process associate physical node/interface/port ID is associated with MS; see col. 11, line 42-67; see col. 13, line 1 to col. 14, line 56; see col. 15, line 27 to col. 16, line 17); and

forwarding a packet by the Home Agent of the router to the Foreign Agent of the router via a physical interface on the router (see FIG. 4, network node 104 includes HLR, VLR, and home directory table; thus the physical interface of the network node 104 enables packets addressed to the home address of the mobile 102 to forward to the VLR via the physical interface identified for the network node 104; see col. 11, line 42-67).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide “associated with the mobile node” as taught by Ahmed in the system of La Porta, so that it would provide efficient, scaleable and flexible communications system capable of handling various application in mobility management techniques as suggested by Ahmed; see col. 3, line 35-50.

**Regarding Claim 31**, La Porta discloses wherein determining comprises: ascertaining whether the router includes a Foreign Agent associated with the care-of address (see FIG. 16a-b, determining if domain router includes foreign agent associated with source care of address); and ascertaining whether the router includes a Home Agent associated with the Home Address (see FIG. 16a-b, determining if domain router includes home agent associated with destination home address; see col. 11, line 58 to col. 12, line 6; see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40; see col. 36, line 55-60).

**Regarding Claim 44**, La Porta discloses a computer readable medium storing thereon computer-readable instruction (see FIG. 6, memory 268 stores instructions for methods/steps; see col. 12, line 1-15) executable by a computer (see FIG. 6, executed by a processor 266; see col. 12, line 1-15 ) for registering mobile node (see FIG. 1, 2, 14, 17, registering Mobile Device MD 114) visiting a Foreign agent (see FIG. 2, visiting Foreign Agent R5/R6; see FIG. 14, R7; or see FIG. 17, R8) with a Home Agent (see FIG. 2, with home agent router R4/Root-Router 150; see FIG. 14, R7; or see FIG. 17, R7/Root-router 360) in a router a router supporting Mobile IP (see FIG. 1, Router R2/R3; FIG. 2, Router R4/R6/Root-Router 150; see FIG. 14, Router R7; see FIG. 17, Router R8 provide Mobile IP; or see FIG. 6, a router in the domain; see col. 4, line 33-36, 55-56), comprising:

Instruction for determining from a Home Address and a care-of address specified in the registration request packet whether the router includes the Foreign Agent and the Home Agent (see FIG. 6, processor 266 and memory 268 of a router in the domain performs processing/determining from destination/home IP address and source care of address in the path setup message whether the domain router has home agent or foreign agent functionalities; also

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see FIG. 16a-b; see col. 11, line 58 to col. 12, line 6; see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40); and

Instruction for registering the mobile node with the Home Agent such that the care-of address and a physical interface of the router are associated with the mobile node (see col. 11, line 58 to col. 12, line 6; setting up the connection with home agent functionality of router so that source care of address and interface Intf A/B of R7, or root router 360 (see FIG. 14) interface Intf B/A of R7/R8, or root router 360 Intf B/C (see FIG. 17) are associated with MD 114; see col. 23, line 41 to col. 24, line 29; see col. 25, line 20 to col. 27, line 25; see col. 27, line 45 to col. 30, line 65) if it is determined that the router includes the Foreign Agent and the Home Agent (see FIG. 14, 16a-b, 17; if the domain router includes both foreign agent functionality and home agent functionality that MD; see col. 7, line 55-69; see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40), thereby enabling packets addressed to the mobile node to be forwarded by the Home Agent of the router (see FIG. 2, so that packets destination to MD from CN 110 to forward/route by the home agent functionality of the router 150; see FIG. 14, by the home agent functionality of the router R7; or see FIG. 17, by the router R7 or home agent functionality of the root router 360) to the Foreign Agent of the router (see FIG. 2, to the foreign agent fundability of the router 150; see FIG. 14, to foreign functionality of the router R7; or see FIG. 17, to the router R8, or foreign agent functionality of the root router 360) via the physical interface (see FIG. 14, via interface Intf A/B at R7, or root router 360; see FIG. 17, via interface Intf B/A at R7/R8, or root router 360 Intf B/C; see col. 23, line 41 to col. 24, line 29; see col. 25, line 20 to col. 27, line 25; see col. 27, line 45 to col. 30, line 65);

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Instruction for receiving a packet addressed to the Home Address of the mobile node (see FIG. 2, 14, 17, receiving a packet with destination/home IP address 318 of the MD) from a corresponding node (see FIG. 2, 19, 20, Corresponding Node CN 110; see col. 4, line 33-42; see col. 33, line 14 to col. 34, line 55) by the Home Agent of the router (see FIG. 2, by home agent functionality of the router 150; see FIG. 14, by the home agent functionality of the router R7; or see FIG. 17, by the router R7 or home agent functionality of the root router 360); and

Instruction for forwarding a packet (see FIG. 6, processor 266 and memory 268 of a router in the domain performs routing/forwarding IP packet; see col. 11, line 58 to col. 12, line 6) by the Home Agent of the router (see FIG. 2, by home agent functionality of the router 150; see FIG. 14, by the home agent functionality of the router R7; or see FIG. 17, by the router R7 or home agent functionality of the root router 360) to the Foreign Agent of the router (see FIG. 2, to the foreign agent fundability of the router 150; see FIG. 14, to foreign functionality of the router R7; or see FIG. 17, to the router R8, or foreign agent functionality of the root router 360) via a physical interface on the router (see FIG. 14, via interface Intf A/B at R7, or root router 360; see FIG. 17, via interface Intf B/A at R7/R8, or root router 360 Intf B/C; see col. 23, line 41 to col. 24, line 29; see col. 25, line 20 to col. 27, line 25; see col. 27, line 45 to col. 30, line 65);

wherein the packet received from the corresponding node (see FIG. 2, 14, 17, the packet received from CN; see col. 4, line 33-42; see col. 33, line 14 to col. 34, line 55) does not identify the physical interface (see FIG. 14, 17, does not indicate/identify the interface Intf on the R7/R8/root router 360; see col. 23, line 41 to col. 24, line 29; col. 25, line 20 to col. 27, line 25; see col. 27, line 45 to col. 30, line 65; also see FIG. 19, see col. 33, line 14 to col. 34, line 55).

La Porta does not explicitly disclose that a physical interface is “associated with the mobile node”.

However, Ahmed teaches in a router (see FIG. 1, 4, network node 104), a method comprising receiving a registration request packet from the mobile node (see FIG. 1, 4, receiving registration request/entry from mobile station 102),

Instruction for determining from the registration request packet whether the router includes the Foreign Agent and the home agent (see col. 15, line 27 to col. 16, line 17; determining registration request/entry whether the network node 104 includes both VLR and HLR);

Instruction for registering the mobile node with the Home Agent of the router such that the address are associated with the mobile node if it is determined that the router includes the Foreign Agent the mobile node and the Home Agent with which the mobile node, (see FIG. 5A-B, MS sends HLR lookup message to direct network node, and the network node determines if the match exists; if a match exists, there network node directs HLR of corresponding mobile in home directory table and HLR initiates search procedure to locate and register the MS; and registration process associate physical node/interface/port ID is associated with MS; see col. 11, line 42-67; see col. 13, line 1 to col. 14, line 56; see col. 15, line 27 to col. 16, line 17); and

Instruction for forwarding a packet by the Home Agent of the router to the Foreign Agent of the router via a physical interface on the router (see FIG. 4, network node 104 includes HLR, VLR, and home directory table; thus the physical interface of the network node 104 enables packets addressed to the home address of the mobile 102 to forward to the VLR via the physical interface identified for the network node 104; see col. 11, line 42-67).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide “associated with the mobile node” as taught by Ahmed in the system of La Porta, so that it would provide efficient, scalable and flexible communications system capable of handling various application in mobility management techniques as suggested by Ahmed; see col. 3, line 35-50.

**Regarding Claim 45**, La Porta discloses in a router supporting Mobile IP (see FIG. 1, Router R2/R3; FIG. 2, Router R4/R6/Root-Router 150; see FIG. 14, Router R7; see FIG. 17, Router R8 provide Mobile IP; or see FIG. 6, a router in the domain; see col. 4, line 33-36, 55-56), a method (see FIG. 3-4, 16A-B, 17, Method) of registering a mobile node (see FIG. 1, 2, 14, 17, Mobile Device MD 114) visiting a Foreign Agent (see FIG. 2, visiting Foreign Agent R5/R6; see FIG. 14, R7; or see FIG. 17, R8) with a Home Agent (see FIG. 2, with home agent router R4/Root-Router 150; see FIG. 14, R7; or see FIG. 17, R7/Root-router 360); see col. 7, line 22 to col. 8, line 45; see col. 23, line 40 to col. 24, line 20; see col. 27, line 45 to col. 28, line 40), the comprising:

means for receiving a registration request packet from the mobile node (see FIG. 6, ingress/receive ports/interfaces 262 of a router in the domain receives path setup message from MD 114; see col. 11, line 58 to col. 12, line 6 see col. 2, line 4-10, 17-30; see col. 5, line 5-15; see col. 7, line 1-20; see col. 8, line 10-45, 64 to col. 7, line 10; see col. 10, line 10-20), the registration request packet (see FIG. 7, 9, path setup message 300; also see FIG. 14, 17, receiving message 1-2; see col. 23, line 40 to col. 24, line 15; see col. 27, line 60 to col. 28, line 27 ) specifying a Home Address (see FIG. 7, 9, includes destination IP address 318) and a care-of address (see FIG. 7, 9, source IP address 316 which is a care of address; see col. 2, line 4-10,

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17-30; see col. 5, line 5-15; see col. 7, line 1-20; see col. 8, line 10-45, 64 to col. 7, line 10; see col. 10, line 10-20; see col. 14, line 25-67; see col. 15, line 20-35);

means for determining from the Home Address and the care-of address specified in the registration request packet whether the router includes the Foreign Agent and the Home Agent (see FIG. 6, processor 266 and memory 268 of a router in the domain performs processing/determining from destination/home IP address and source care of address in the path setup message whether the domain router has home agent or foreign agent functionalities; also see FIG. 16a-b; see col. 11, line 58 to col. 12, line 6; see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40); and

means for registering the mobile node with the Home Agent such that the care-of address and a physical interface of the router are associated with the mobile node (see col. 11, line 58 to col. 12, line 6; setting up the connection with home agent functionality of router so that source care of address and interface Intf A/B of R7, or root router 360 (see FIG. 14) interface Intf B/A of R7/R8, or root router 360 Intf B/C (see FIG. 17) are associated with MD 114; see col. 23, line 41 to col. 24, line 29; see col. 25, line 20 to col. 27, line 25; see col. 27, line 45 to col. 30, line 65) if it is determined that the router includes the Foreign Agent and the Home Agent (see FIG. 14, 16a-b, 17; if the domain router includes both foreign agent functionality and home agent functionality that MD; see col. 7, line 55-69; see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40), thereby enabling packets addressed to the mobile node to be forwarded by the Home Agent of the router (see FIG. 2, so that packets destination to MD from CN 110 to forward/route by the home agent functionality of the router 150; see FIG. 14, by the home agent functionality of the router R7; or see FIG. 17, by the router R7 or home agent



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functionality of the root router 360) to the Foreign Agent of the router (see FIG. 2, to the foreign agent fundability of the router 150; see FIG. 14, to foreign functionality of the router R7; or see FIG. 17, to the router R8, or foreign agent functionality of the root router 360) via the physical interface (see FIG. 14, via interface Intf A/B at R7, or root router 360; see FIG. 17, via interface Intf B/A at R7/R8, or root router 360 Intf B/C; see col. 23, line 41 to col. 24, line 29; see col. 25, line 20 to col. 27, line 25; see col. 27, line 45 to col. 30, line 65);

means for receiving a packet addressed to the Home Address of the mobile node (see FIG. 2, 14, 17, receiving a packet with destination/home IP address 318 of the MD) from a corresponding node (see FIG. 2, 19, 20, Corresponding Node CN 110; see col. 4, line 33-42; see col. 33, line 14 to col. 34, line 55) by the Home Agent of the router (see FIG. 2, by home agent functionality of the router 150; see FIG. 14, by the home agent functionality of the router R7; or see FIG. 17, by the router R7 or home agent functionality of the root router 360); and

means for forwarding a packet (see FIG. 6, processor 266 and memory 268 of a router in the domain performs routing/forwarding IP packet; see col. 11, line 58 to col. 12, line 6) by the Home Agent of the router (see FIG. 2, by home agent functionality of the router 150; see FIG. 14, by the home agent functionality of the router R7; or see FIG. 17, by the router R7 or home agent functionality of the root router 360) to the Foreign Agent of the router (see FIG. 2, to the foreign agent fundability of the router 150; see FIG. 14, to foreign functionality of the router R7; or see FIG. 17, to the router R8, or foreign agent functionality of the root router 360) via a physical interface on the router (see FIG. 14, via interface Intf A/B at R7, or root router 360; see FIG. 17, via interface Intf B/A at R7/R8, or root router 360 Intf B/C; see col. 23, line 41 to col. 24, line 29; see col. 25, line 20 to col. 27, line 25; see col. 27, line 45 to col. 30, line 65);

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wherein the packet received from the corresponding node (see FIG. 2, 14, 17, the packet received from CN; see col. 4, line 33-42; see col. 33, line 14 to col. 34, line 55) does not identify the physical interface (see FIG. 14, 17, does not indicate/identify the interface Intf on the R7/R8/root router 360; see col. 23, line 41 to col. 24, line 29; col. 25, line 20 to col. 27, line 25; see col. 27, line 45 to col. 30, line 65; also see FIG. 19, see col. 33, line 14 to col. 34, line 55).

La Porta does not explicitly disclose that a physical interface is “associated with the mobile node”.

However, Ahmed teaches in a router (see FIG. 1, 4, network node 104), a method comprising receiving a registration request packet from the mobile node (see FIG. 1, 4, receiving registration request/entry from mobile station 102),

determining from the registration request packet whether the router includes the Foreign Agent and the home agent (see col. 15, line 27 to col. 16, line 17; determining registration request/entry whether the network node 104 includes both VLR and HLR);

registering the mobile node with the Home Agent of the router such that the address are associated with the mobile node if it is determined that the router includes the Foreign Agent the mobile node and the Home Agent with which the mobile node (see FIG. 5A-B, MS sends HLR lookup message to direct network node, and the network node determines if the match exists; if a match exists, there network node directs HLR of corresponding mobile in home directory table and HLR initiates search procedure to locate and register the MS; and registration process associate physical node/interface/port ID is associated with MS; see col. 11, line 42-67; see col. 13, line 1 to col. 14, line 56; see col. 15, line 27 to col. 16, line 17); and

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forwarding a packet by the Home Agent of the router to the Foreign Agent of the router via a physical interface on the router (see FIG. 4, network node 104 includes HLR, VLR, and home directory table; thus the physical interface of the network node 104 enables packets addressed to the home address of the mobile 102 to forward to the VLR via the physical interface identified for the network node 104; see col. 11, line 42-67).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide “associated with the mobile node” as taught by Ahmed in the system of La Porta, so that it would provide efficient, scaleable and flexible communications system capable of handling various application in mobility management techniques as suggested by Ahmed; see col. 3, line 35-50.

**Regarding Claim 46**, La Porta discloses a computer readable medium storing thereon computer-readable instruction (see FIG. 6, memory 268 stores instructions for methods/steps; see col. 12, line 1-15) executable by a computer (see FIG. 6, executed by a processor 266; see col. 12, line 1-15 ) for registering mobile node (see FIG. 1, 2, 14, 17, registering Mobile Device MD 114) visiting a Foreign agent (see FIG. 2, visiting Foreign Agent R5/R6; see FIG. 14, R7; or see FIG. 17, R8) with a Home Agent (see FIG. 2, with home agent router R4/Root-Router 150; see FIG. 14, R7; or see FIG. 17, R7/Root-router 360) in a router a router supporting Mobile IP (see FIG. 1, Router R2/R3; FIG. 2, Router R4/R6/Root-Router 150; see FIG. 14, Router R7; see FIG. 17, Router R8 provide Mobile IP; or see FIG. 6, a router in the domain; see col. 4, line 33-36, 55-56), comprising:

Instruction for determining (see FIG. 6, processor 266 and memory 268 of a router in the domain performs processing/determining; see col. 11, line 58 to col. 12, line 6) from a

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registration request packet whether the router includes the Foreign Agent that the mobile node is visiting (see FIG. 6, processor 266 and memory 268 of a router in the domain determines from the path setup message whether the router is the foreign agent that MD 114 is in foreign domain; see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40; also see FIG. 16a-b,) by ascertaining care-of address specified in the registration request packet and an address of the router (see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40; by determining that source IP care of address in the path set up message and the address of the router);

Instruction for determining from a home address of the registration request packet whether the router includes the Home Agent with which the mobile node is registering (see FIG. 6, processor 266 and memory 268 of a router in the domain performs processing/determining from destination/home IP address of the path setup message whether the domain router is the home agent that MD 114 is registering; also see FIG. 16a-b; see col. 11, line 58 to col. 12, line 6; see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40); and

Instruction for registering the mobile node visiting the Foreign Agent of the router (see FIG. 6, processor 266 and memory 268 of a router in the domain performs setup/registering MD 114; see col. 11, line 58 to col. 12, line 6) with the Home Agent of the router (see FIG. 2, 14, 17, with domain router with home agent functionality; see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40) if it is determined from the registration request packet that the router includes the Foreign Agent the mobile node is visiting (see FIG. 14, 16a-b, 17; the domain router includes foreign agent functionality that MD 114 visiting) and the Home Agent with which the mobile node is registering (see FIG. 14, 16a-b, 17, home agent functionality that

MD is setting up the connection; note that domain router have both home agent functionality and foreign agent functionality; see col. 7, line 55-69; see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40), and

Instruction for forwarding a packet (see FIG. 6, processor 266 and memory 268 of a router in the domain performs routing/forwarding IP packet; see col. 11, line 58 to col. 12, line 6) by the Home Agent of the router (see FIG. 2, by home agent functionality of the router 150; see FIG. 14, by the home agent functionality of the router R7; or see FIG. 17, by the router R7 or home agent functionality of the root router 360) to the Foreign Agent of the router (see FIG. 2, to the foreign agent fundability of the router 150; see FIG. 14, to foreign functionality of the router R7; or see FIG. 17, to the router R8, or foreign agent functionality of the root router 360) via a physical interface on the router (see FIG. 14, via interface Intf A/B at R7, or root router 360; see FIG. 17, via interface Intf B/A at R7/R8, or root router 360 Intf B/C; see col. 23, line 41 to col. 24, line 29; see col. 25, line 20 to col. 27, line 25; see col. 27, line 45 to col. 30, line 65);

wherein the packet received from the corresponding node (see FIG. 2, 14, 17, the packet received from CN; see col. 4, line 33-42; see col. 33, line 14 to col. 34, line 55) does not identify the physical interface (see FIG. 14, 17, does not indicate/identify the interface Intf on the R7/R8/root router 360; see col. 23, line 41 to col. 24, line 29; col. 25, line 20 to col. 27, line 25; see col. 27, line 45 to col. 30, line 65; also see FIG. 19, see col. 33, line 14 to col. 34, line 55).

La Porta does not explicitly disclose “by ascertaining whether the care-of address specified in the registration request packet is equivalent to an address of the router”.

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However, Ahmed teaches in a router (see FIG. 1, 4, network node 104), a method comprising Instruction for receiving a registration request packet from the mobile node (see FIG. 1, 4, receiving registration request/entry from mobile station 102),

Instruction for determining from the registration request packet whether the router includes the Foreign Agent that the mobile node is visiting (see col. 15, line 27 to col. 16, line 17; determining registration request/entry whether the network node 104 includes VLR that MS is visiting ) by ascertaining whether the address specified in the registration request packet is equivalent to an address of the router (see FIG. 4, by determining/matching if there is a match to the hose name/address the mobile is visiting by checking host name/address of VLR; see col. 15, line 27 to col. 16, line 17);

Instruction for determining from the registration request packet whether the router includes the Home Agent with which the mobile node is registering (see FIG. 4, determining registration request/entry whether network node with which mobile station MS is registration (by HLR SNLA lookup to query HLR location of the mobile); see col. 15, line 27 to col. 16, line 17); and

Instruction for registering the mobile node with the Home Agent of the router if it is determined from the registration request packet that the router includes the Foreign Agent the mobile node is visiting and the Home Agent with which the mobile node is registering (see FIG. 5A-B, MS sends HLR lookup message to direct network node, and the network node determines if the match exists; if a match exists, there network node directs HLR of corresponding mobile in home directory table and HLR initiates search procedure to locate and register the MS; see col. 13, line 1 to col. 14, line 56; see col. 15, line 27 to col. 16, line 17); and

Instruction for forwarding a packet by the Home Agent of the router to the Foreign Agent of the router via a physical interface on the router (see FIG. 4, network node 104 includes HLR, VLR, and home directory table; thus the physical interface of the network node 104 enables packets addressed to the home address of the mobile 102 to forward to the VLR via the physical interface identified for the network node 104; see col. 11, line 42-67).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide “by ascertaining whether the care-of address specified in the registration request packet is equivalent to an address of the router” as taught by Ahmed in the system of La Porta, so that it would provide efficient, scalable and flexible communications system capable of handling various application in mobility management techniques as suggested by Ahmed; see col. 3, line 35-50.

**Regarding Claim 47**, La Porta discloses wherein registering the mobile node is performed to reach the mobile node as set forth above in claim 46.

La Porta does not explicitly disclose “without creating a tunnel interface”.

However, Ahmed teaches wherein registering the mobile node is performed without creating a tunnel interface to reach the mobile node (see col. 13, line 5 to col. 14, line 55; in home and visitor location registration, each mobile station is assigned a HLR, which includes mobile host name, unique ID, SNLA, time of entry and expiration time. Each network node maintains a VLR that records information on mobiles that are within its coverage area and have registered with it, thus it is clear that registration is performed without a tunnel interface).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide “without creating a tunnel interface” as taught by Ahmed in

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the system of La Porta, so that it would provide efficient, scaleable and flexible communications system capable of handling various application in mobility management techniques as suggested by Ahmed; see col. 3, line 35-50.

**Regarding Claim 48**, La Porta discloses wherein registering the mobile node is performed to reach the Home Agent as set forth above in claim 46.

La Porta does not explicitly disclose “without creating a tunnel interface”.

However, Ahmed teaches wherein registering the mobile node is performed without creating a tunnel interface to reach the home agent (see col. 13, line 5 to col. 14, line 55; in home and visitor location registration, each mobile station is assigned a HLR, which includes mobile host name, unique ID, SNLA, time of entry and expiration time. Each network node maintains a VLR that records information on mobiles that are within its coverage area and have registered with it, thus it is clear that registration is performed without a tunnel interface).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide “without creating a tunnel interface” as taught by Ahmed in the system of La Porta, so that it would provide efficient, scaleable and flexible communications system capable of handling various application in mobility management techniques as suggested by Ahmed; see col. 3, line 35-50.

**Regarding Claim 49**, La Porta discloses forwarding the registration request packet to the Home Agent (see FIG. 17, forwarding/routing setup request to the home agent router R7) if it is ascertained from the registration request packet that the router does not include the Home Agent, wherein the Home Agent is external to the router (see FIG. 17, after determining that setup request that R8/root router 360 does not include home agent, and home agent is home agent



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router R7); see col. 28, line 5 to col. 29, line 7). Ahmed also discloses forwarding the registration request packet to the Home Agent if it is ascertained from the registration request packet that the router does not include the Home Agent, wherein the Home Agent is external to the router (see FIG. 5A-B, initiating mobile sends HLR lookup message to direct network node. Network node checks to determine if a match exist, if no match exists, the direct network node directs HLR of correspondent mobile in home directory table and HLR initiate search procedure to locate the correspondent mobile).

**Regarding Claim 50**, La Porta discloses a router supporting Mobile IP (see FIG. 1, Router R2/R3; FIG. 2, Router R4/R6/Root-Router 150; see FIG. 14, Router R7; see FIG. 17, Router R8 provide Mobile IP; or see FIG. 6, a router in the domain; see col. 4, line 33-36, 55-56) adapted for registering a mobile node (see FIG. 1, 2, 14, 17, Mobile Device MD 114) visiting a Foreign Agent (see FIG. 2, visiting Foreign Agent R5/R6; see FIG. 14, R7; or see FIG. 17, R8) with a Home Agent (see FIG. 2, with home agent router R4/Root-Router 150; see FIG. 14, R7; or see FIG. 17, R7/Root-router 360); see col. 7, line 22 to col. 8, line 45; see col. 23, line 40 to col. 24, line 20; see col. 27, line 45 to col. 28, line 40), comprising:

means for receiving (see FIG. 6, ingress/receive ports/interfaces 262 of a router in the domain; see col. 11, line 58 to col. 12, line 6) a registration request packet from the mobile node (see col. 2, line 4-10, 17-30; see col. 5, line 5-15; see col. 7, line 1-20; see col. 8, line 10-45, 64 to col. 7, line 10; see col. 10, line 10-20; receiving path setup message from MD 114), the registration request packet (see FIG. 7, 9, path setup message 300; also see FIG. 14, 17, receiving message 1-2; see col. 23, line 40 to col. 24, line 15; see col. 27, line 60 to col. 28, line 27 ) specifying a Home Address (see FIG. 7, 9, includes destination IP address 318) and a care-

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of address (see FIG. 7, 9, source IP address 316 which is a care of address; see col. 2, line 4-10, 17-30; see col. 5, line 5-15; see col. 7, line 1-20; see col. 8, line 10-45, 64 to col. 7, line 10; see col. 10, line 10-20; see col. 14, line 25-67; see col. 15, line 20-35);

means for determining (see FIG. 6, processor 266 and memory 268 of a router in the domain performs processing/determining; see col. 11, line 58 to col. 12, line 6) from the registration request packet whether the router includes the Foreign Agent that the mobile node is visiting (see FIG. 16a-b, from the path setup message whether the router is the foreign agent that MD 114 is in foreign domain; see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40) by ascertaining care-of address specified in the registration request packet and an address of the router (see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40; by determining that source IP care of address in the path set up message and the address of the router);

means for determining (see FIG. 6, processor 266 and memory 268 of a router in the domain performs processing/determining; see col. 11, line 58 to col. 12, line 6) from the registration request packet whether the router includes the Home Agent with which the mobile node is registering (see FIG. 16a-b, from the path setup message whether the domain router is the home agent that MD 114 is registering; see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40); and

means for registering (see FIG. 6, processor 266 and memory 268 of a router in the domain performs setup/registering; see col. 11, line 58 to col. 12, line 6) the mobile node (see FIG. 2, 14, 17, MD 114) with the Home Agent of the router (see FIG. 2, 14, 17, domain router with home agent functionality) if it is determined from the registration request packet that the

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router includes the Foreign Agent the mobile node is visiting (see FIG. 14, 16a-b, 17; the domain router includes foreign agent functionality that MD 114 visiting) and the Home Agent with which the mobile node is registering (see FIG. 14, 16a-b, 17, home agent functionality that MD is setting up the connection; note that domain router have both home agent functionality and foreign agent functionality; see col. 7, line 55-69; see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40); and

means for forwarding a packet (see FIG. 6, processor 266 and memory 268 of a router in the domain performs routing/forwarding IP packet; see col. 11, line 58 to col. 12, line 6) by the Home Agent of the router (see FIG. 2, by home agent functionality of the router 150; see FIG. 14, by the home agent functionality of the router R7; or see FIG. 17, by the router R7 or home agent functionality of the root router 360) to the Foreign Agent of the router (see FIG. 2, to the foreign agent fundability of the router 150; see FIG. 14, to foreign functionality of the router R7; or see FIG. 17, to the router R8, or foreign agent functionality of the root router 360) via a physical interface on the router (see FIG. 14, via interface Intf A/B at R7, or root router 360; see FIG. 17, via interface Intf B/A at R7/R8, or root router 360 Intf B/C; see col. 23, line 41 to col. 24, line 29; see col. 25, line 20 to col. 27, line 25; see col. 27, line 45 to col. 30, line 65);

wherein the packet is addressed to the Home Address of the mobile node (see FIG. 14, 17, IP packet is addressed to the home/destination IP address 318 of mobile node (i.e. home agent address R7/root router 360 that corresponds to the mobile node) ) and does not identify the physical interface on the router (see FIG. 14, the packet does not indicate/identify the interface Intf on the R7/R8/root router 360; see col. 23, line 41 to col. 24, line 29; col. 25, line 20 to col.

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27, line 25; see col. 27, line 45 to col. 30, line 65; also see FIG. 19, see col. 33, line 14 to col. 34, line 55).

La Porta does not explicitly disclose “by ascertaining whether the care-of address specified in the registration request packet is equivalent to an address of the router”.

However, Ahmed teaches a router (see FIG. 1, 4, network node 104) comprising receiving a registration request packet from the mobile node (see FIG. 1, 4, receiving registration request/entry from mobile station 102),

determining from the registration request packet whether the router includes the Foreign Agent that the mobile node is visiting (see col. 15, line 27 to col. 16, line 17; determining registration request/entry whether the network node 104 includes VLR that MS is visiting ) by ascertaining whether the address specified in the registration request packet is equivalent to an address of the router (see FIG. 4, by determining/matching if there is a match to the hose name/address the mobile is visiting by checking host name/address of VLR; see col. 15, line 27 to col. 16, line 17) ;

determining from the registration request packet whether the router includes the Home Agent with which the mobile node is registering (see FIG. 4, determining registration request/entry whether network node with which mobile station MS is registration (by HLR SNLA lookup to query HLR location of the mobile); see col. 15, line 27 to col. 16, line 17); and

registering the mobile node with the Home Agent of the router if it is determined from the registration request packet that the router includes the Foreign Agent the mobile node is visiting and the Home Agent with which the mobile node is registering (see FIG. 5A-B, MS sends HLR lookup message to direct network node, and the network node determines if the

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match exists; if a match exists, there network node directs HLR of corresponding mobile in home directory table and HLR initiates search procedure to locate and register the MS; see col. 13, line 1 to col. 14, line 56; see col. 15, line 27 to col. 16, line 17); and

forwarding a packet by the Home Agent of the router to the Foreign Agent of the router via a physical interface on the router (see FIG. 4, network node 104 includes HLR, VLR, and home directory table; thus the physical interface of the network node 104 enables packets addressed to the home address of the mobile 102 to forward to the VLR via the physical interface identified for the network node 104; see col. 11, line 42-67).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide “by ascertaining whether the care-of address specified in the registration request packet is equivalent to an address of the router” as taught by Ahmed in the system of La Porta, so that it would provide efficient, scaleable and flexible communications system capable of handling various application in mobility management techniques as suggested by Ahmed; see col. 3, line 35-50.

**Regarding Claim 51**, La Porta discloses wherein registering the mobile node is performed to reach the mobile node as set forth above in claim 50.

La Porta does not explicitly disclose “without creating a tunnel interface”.

However, Ahmed teaches wherein registering the mobile node is performed without creating a tunnel interface to reach the mobile node (see col. 13, line 5 to col. 14, line 55; in home and visitor location registration, each mobile station is assigned a HLR, which includes mobile host name, unique ID, SNLA, time of entry and expiration time. Each network node

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maintains a VLR that records information on mobiles that are within its coverage area and have registered with it, thus it is clear that registration is performed without a tunnel interface).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide “without creating a tunnel interface” as taught by Ahmed in the system of La Porta, so that it would provide efficient, scaleable and flexible communications system capable of handling various application in mobility management techniques as suggested by Ahmed; see col. 3, line 35-50.

**Regarding Claim 52**, La Porta discloses wherein registering the mobile node is performed to reach the Home Agent as set forth above in claim 50.

La Porta does not explicitly disclose “without creating a tunnel interface”.

However, Ahmed teaches wherein registering the mobile node is performed without creating a tunnel interface to reach the home agent (see col. 13, line 5 to col. 14, line 55; in home and visitor location registration, each mobile station is assigned a HLR, which includes mobile host name, unique ID, SNLA, time of entry and expiration time. Each network node maintains a VLR that records information on mobiles that are within its coverage area and have registered with it, thus it is clear that registration is performed without a tunnel interface).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide “without creating a tunnel interface” as taught by Ahmed in the system of La Porta, so that it would provide efficient, scaleable and flexible communications system capable of handling various application in mobility management techniques as suggested by Ahmed; see col. 3, line 35-50.

**Regarding Claim 53**, La Porta discloses means for forwarding the registration request packet to the Home Agent (see FIG. 17, forwarding/routing setup request to the home agent router R7) if it is ascertained from the registration request packet that the router does not include the Home Agent, wherein the Home Agent is external to the router (see FIG. 17, after determining that setup request that R8/root router 360 does not include home agent, and home agent is home agent router R7); see col. 28, line 5 to col. 29, line 7). Ahmed also discloses means for forwarding the registration request packet to the Home Agent if it is ascertained from the registration request packet that the router does not include the Home Agent, wherein the Home Agent is external to the router (see FIG. 5A-B, initiating mobile sends HLR lookup message to direct network node. Network node checks to determine if a match exist, if no match exists, the direct network node directs HLR of correspondent mobile in home directory table and HLR initiate search procedure to locate the correspondent mobile).

**Regarding Claim 54**, La Porta discloses in a router supporting Mobile IP (see FIG. 1, Router R2/R3; FIG. 2, Router R4/R6/Root-Router 150; see FIG. 14, Router R7; see FIG. 17, Router R8 provide Mobile IP; or see FIG. 6, a router in the domain; see col. 4, line 33-36, 55-56), a method (see FIG. 3-4, 16A-B, 17, Method) of registering a mobile node (see FIG. 1, 2, 14, 17, Mobile Device MD 114) visiting a Foreign Agent (see FIG. 2, visiting Foreign Agent R5/R6; see FIG. 14, R7; or see FIG. 17, R8) with a Home Agent (see FIG. 2, with home agent router R4/Root-Router 150; see FIG. 14, R7; or see FIG. 17, R7/Root-router 360); see col. 7, line 22 to col. 8, line 45; see col. 23, line 40 to col. 24, line 20; see col. 27, line 45 to col. 28, line 40), the comprising:

a processor (see FIG. 6, executed by a processor 266; see col. 12, line 1-15) and

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a memory (see FIG. 6, memory 268 stores instructions for methods/steps; see col. 12, line 1-15), at least one of the processor or the memory being adapted for:

receiving a registration request packet from the mobile node (see FIG. 6, ingress/receive ports/interfaces 262 of a router in the domain receives path setup message from MD 114; see col. 11, line 58 to col. 12, line 6 see col. 2, line 4-10, 17-30; see col. 5, line 5-15; see col. 7, line 1-20; see col. 8, line 10-45, 64 to col. 7, line 10; see col. 10, line 10-20; receiving), the registration request packet (see FIG. 7, 9, path setup message 300; also see FIG. 14, 17, receiving message 1-2; see col. 23, line 40 to col. 24, line 15; see col. 27, line 60 to col. 28, line 27 ) specifying a Home Address (see FIG. 7, 9, includes destination IP address 318) and a care-of address (see FIG. 7, 9, source IP address 316 which is a care of address; see col. 2, line 4-10, 17-30; see col. 5, line 5-15; see col. 7, line 1-20; see col. 8, line 10-45, 64 to col. 7, line 10; see col. 10, line 10-20; see col. 14, line 25-67; see col. 15, line 20-35);

determining (see FIG. 6, processor 266 and memory 268 of a router in the domain performs processing/determining; see col. 11, line 58 to col. 12, line 6) from the registration request packet whether the router includes the Foreign Agent that the mobile node is visiting (see FIG. 6, processor 266 and memory 268 of a router in the domain determines from the path setup message whether the router is the foreign agent that MD 114 is in foreign domain; see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40; also see FIG. 16a-b,) by ascertaining care-of address specified in the registration request packet and an address of the router (see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40; by determining that source IP care of address in the path set up message and the address of the router);



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determining from the registration request packet whether the router includes the Home Agent with which the mobile node is registering (see FIG. 6, processor 266 and memory 268 of a router in the domain performs processing/determining from the path setup message whether the domain router is the home agent that MD 114 is registering; also see FIG. 16a-b; see col. 11, line 58 to col. 12, line 6; see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40); and

if it is determined from the registration request packet that the router includes the Foreign Agent the mobile node is visiting (see FIG. 14, 16a-b, 17; the domain router includes foreign agent functionality that MD 114 visiting) and the Home Agent with which the mobile node is registering (see FIG. 14, 16a-b, 17, home agent functionality that MD is setting up the connection; note that domain router have both home agent functionality and foreign agent functionality; see col. 7, line 55-69; see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40), registering the mobile node visiting the Foreign Agent of the router (see FIG. 6, processor 266 and memory 268 of a router in the domain performs setup/registering MD 114; see col. 11, line 58 to col. 12, line 6) with the Home Agent of the router (see FIG. 2, 14, 17, with domain router with home agent functionality; see col. 24, line 1-20; see col. 25, line 20 to col. 27, line 25; see col. 28, line 24-40); and

receiving a packet addressed to the Home Address of the mobile node (see FIG. 2, 14, 17, receiving a packet with destination/home IP address 318 of the MD) from a corresponding node (see FIG. 2, 19, 20, Corresponding Node CN 110; see col. 4, line 33-42; see col. 33, line 14 to col. 34, line 55) by the Home Agent of the router (see FIG. 2, by home agent functionality of the

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router 150; see FIG. 14, by the home agent functionality of the router R7; or see FIG. 17, by the router R7 or home agent functionality of the root router 360); and

forwarding a packet (see FIG. 6, processor 266 and memory 268 of a router in the domain performs routing/forwarding IP packet; see col. 11, line 58 to col. 12, line 6) by the Home Agent of the router (see FIG. 2, by home agent functionality of the router 150; see FIG. 14, by the home agent functionality of the router R7; or see FIG. 17, by the router R7 or home agent functionality of the root router 360) to the Foreign Agent of the router (see FIG. 2, to the foreign agent functionality of the router 150; see FIG. 14, to foreign functionality of the router R7; or see FIG. 17, to the router R8, or foreign agent functionality of the root router 360) via a physical interface on the router (see FIG. 14, via interface Intf A/B at R7, or root router 360; see FIG. 17, via interface Intf B/A at R7/R8, or root router 360 Intf B/C; see col. 23, line 41 to col. 24, line 29; see col. 25, line 20 to col. 27, line 25; see col. 27, line 45 to col. 30, line 65);

wherein the packet received from the corresponding node (see FIG. 2, 14, 17, the packet received from CN; see col. 4, line 33-42; see col. 33, line 14 to col. 34, line 55) does not identify the physical interface (see FIG. 14, 17, does not indicate/identify the interface Intf on the R7/R8/root router 360; see col. 23, line 41 to col. 24, line 29; col. 25, line 20 to col. 27, line 25; see col. 27, line 45 to col. 30, line 65; also see FIG. 19, see col. 33, line 14 to col. 34, line 55).

La Porta does not explicitly disclose “by ascertaining whether the care-of address specified in the registration request packet is equivalent to an address of the router”.

However, Ahmed teaches in a router (see FIG. 1, 4, network node 104), a method comprising receiving a registration request packet from the mobile node (see FIG. 1, 4, receiving registration request/entry from mobile station 102),

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determining from the registration request packet whether the router includes the Foreign Agent that the mobile node is visiting (see col. 15, line 27 to col. 16, line 17; determining registration request/entry whether the network node 104 includes VLR that MS is visiting ) by ascertaining whether the address specified in the registration request packet is equivalent to an address of the router (see FIG. 4, by determining/matching if there is a match to the host name/address the mobile is visiting by checking host name/address of VLR; see col. 15, line 27 to col. 16, line 17) ;

determining from the registration request packet whether the router includes the Home Agent with which the mobile node is registering (see FIG. 4, determining registration request/entry whether network node with which mobile station MS is registration (by HLR SNLA lookup to query HLR location of the mobile); see col. 15, line 27 to col. 16, line 17); and

registering the mobile node with the Home Agent of the router if it is determined from the registration request packet that the router includes the Foreign Agent the mobile node is visiting and the Home Agent with which the mobile node is registering (see FIG. 5A-B, MS sends HLR lookup message to direct network node, and the network node determines if the match exists; if a match exists, there network node directs HLR of corresponding mobile in home directory table and HLR initiates search procedure to locate and register the MS; see col. 13, line 1 to col. 14, line 56; see col. 15, line 27 to col. 16, line 17); and

forwarding a packet by the Home Agent of the router to the Foreign Agent of the router via a physical interface on the router (see FIG. 4, network node 104 includes HLR, VLR, and home directory table; thus the physical interface of the network node 104 enables packets

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addressed to the home address of the mobile 102 to forward to the VLR via the physical interface identified for the network node 104; see col. 11, line 42-67).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide “by ascertaining whether the care-of address specified in the registration request packet is equivalent to an address of the router” as taught by Ahmed in the system of La Porta, so that it would provide efficient, scaleable and flexible communications system capable of handling various application in mobility management techniques as suggested by Ahmed; see col. 3, line 35-50.

**Regarding Claim 55**, La Porta discloses wherein registering the mobile node is performed to reach the mobile node as set forth above in claim 57.

La Porta does not explicitly disclose “without creating a tunnel interface”.

However, Ahmed teaches wherein registering the mobile node is performed without creating a tunnel interface to reach the mobile node (see col. 13, line 5 to col. 14, line 55; in home and visitor location registration, each mobile station is assigned a HLR, which includes mobile host name, unique ID, SNLA, time of entry and expiration time. Each network node maintains a VLR that records information on mobiles that are within its coverage area and have registered with it, thus it is clear that registration is performed without a tunnel interface).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide “without creating a tunnel interface” as taught by Ahmed in the system of La Porta, so that it would provide efficient, scaleable and flexible communications system capable of handling various application in mobility management techniques as suggested by Ahmed; see col. 3, line 35-50.

**Regarding Claim 56**, La Porta discloses wherein registering the mobile node is performed to reach the Home Agent as set forth above in claim 54.

La Porta does not explicitly disclose “without creating a tunnel interface”.

However, Ahmed teaches wherein registering the mobile node is performed without creating a tunnel interface to reach the home agent (see col. 13, line 5 to col. 14, line 55; in home and visitor location registration, each mobile station is assigned a HLR, which includes mobile host name, unique ID, SNLA, time of entry and expiration time. Each network node maintains a VLR that records information on mobiles that are within its coverage area and have registered with it, thus it is clear that registration is performed without a tunnel interface).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide “without creating a tunnel interface” as taught by Ahmed in the system of La Porta, so that it would provide efficient, scaleable and flexible communications system capable of handling various application in mobility management techniques as suggested by Ahmed; see col. 3, line 35-50.

**Regarding Claim 57**, La Porta discloses at least one of the processor and the memory are further adapted for forwarding the registration request packet to the Home Agent (see FIG. 17, forwarding/routing setup request to the home agent router R7) if it is ascertained from the registration request packet that the router does not include the Home Agent, wherein the Home Agent is external to the router (see FIG. 17, after determining that setup request that R8/root router 360 does not include home agent, and home agent is home agent router R7); see col. 28, line 5 to col. 29, line 7). Ahmed also discloses forwarding the registration request packet to the Home Agent if it is ascertained from the registration request packet that the router does not

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include the Home Agent, wherein the Home Agent is external to the router (see FIG. 5A-B, initiating mobile sends HLR lookup message to direct network node. Network node checks to determine if a match exist, if no match exists, the direct network node directs HLR of correspondent mobile in home directory table and HLR initiate search procedure to locate the correspondent mobile).

11. Claims 32, 33, 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over La Porta (US006434134B1) in view of Yuan (US2001/0041571).

**Regarding Claim 32**, La Porta discloses in a router (see FIG. 1, Router R2/R3; FIG. 2, Router R4/R6/Root-Router 150; see FIG. 14, Router R7; see FIG. 17, Router R8 provide Mobile IP; or see FIG. 6, a router in the domain; see col. 4, line 33-36, 55-56) including a Home Agent having a Home Agent address (see FIG. 2, home agent router R4/Root-Router 150; see FIG. 14, R7; or see FIG. 17, R7/Root-router 360 having destination IP address 318) a Foreign Agent (see FIG. 2, visiting Foreign Agent R5/R6; see FIG. 14, R7; or see FIG. 17, R8), supporting Mobile IP (see FIG. 1, Router R2/R3; FIG. 2, Router R4/R6/Root-Router 150; see FIG. 14, Router R7; see FIG. 17, Router R8 provide Mobile IP; or see FIG. 6, a router in the domain; see col. 4, line 33-36, 55-56), a method (see FIG. 3-4, 16A-B, 17, Method) of registering a mobile node (see FIG. 1, 2, 14, 17, Mobile Device MD 114) visiting a Foreign Agent (see FIG. 2, visiting Foreign Agent R5/R6; see FIG. 14, R7; or see FIG. 17, R8) with a Home Agent (see FIG. 2, with home agent router R4/Root-Router 150; see FIG. 14, R7; or see FIG. 17, R7/Root-router 360); see col. 7, line 22 to col. 8, line 45; see col. 23, line 40 to col. 24, line 20; see col. 27, line 45 to col. 28, line 40), the method comprising:

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receiving a registration request packet (see FIG. 6, ingress/receive ports/interfaces 262 of a router in the domain receives path setup message from MD 114; see col. 11, line 58 to col. 12, line 6 see col. 2, line 4-10, 17-30; see col. 5, line 5-15; see col. 7, line 1-20; see col. 8, line 10-45, 64 to col. 7, line 10; see col. 10, line 10-20), the registration request packet specifying a Home Address (see FIG. 7, 9, includes destination IP address 318) and a care-of address (see FIG. 7, 9, source IP address 316 which is a care of address; see col. 2, line 4-10, 17-30; see col. 5, line 5-15; see col. 7, line 1-20; see col. 8, line 10-45, 64 to col. 7, line 10; see col. 10, line 10-20; see col. 14, line 25-67; see col. 15, line 20-35), wherein the Home Address specified in the registration request packet is used to identify the Home Agent address associated with the router (see FIG. 7, 9, destination IP address 318 in the path setup request is used to identify the home agent address (i.e. address of home agent functionality, or old base station) associated with domain router; see col. 2, line 4-10, 17-30; see col. 5, line 5-15; see col. 7, line 1-20; see col. 8, line 10-45, 64 to col. 7, line 10; see col. 10, line 10-20; see col. 14, line 25-67; see col. 15, line 20-35) and the care-of address specified in the registration request packet is equivalent to the Foreign Agent address (see FIG. 7, 9, 24, a care of address is foreign agent address; see col. 36, line 55-61); and

registering the mobile node visiting the Foreign Agent of the router with the Home Agent of the router (see col. 11, line 58 to col. 12, line 6; setting up the connection for MD 114 visiting foreign agent functionality of the domain router with the home agent functionality of router) such that packets addressed to the Home Address that are received by the Home Agent (see FIG. 2, so that packet from CN 110 address to destination/home address that are received by the home agent functionality of the router 150; see FIG. 14, by the home agent functionality of the router

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R7; or see FIG. 17, by the router R7 or home agent functionality of the root router 360) can be forwarded to the Foreign Agent (see FIG. 2, route/forward to the foreign agent fundability of the router 150; see FIG. 14, to foreign functionality of the router R7; or see FIG. 17, to the router R8, or foreign agent functionality of the root router 360) via a physical interface on the router (see FIG. 14, via interface Intf A/B at R7, or root router 360; see FIG. 17, via interface Intf B/A at R7/R8, or root router 360 Intf B/C; see col. 23, line 41 to col. 24, line 29; see col. 25, line 20 to col. 27, line 25; see col. 27, line 45 to col. 30, line 65);

receiving a packet addressed to the Home Address of the mobile node (see FIG. 2, 14, 17, receiving a packet with destination/home IP address 318 of the MD) from a corresponding node (see FIG. 2, 19, 20, Corresponding Node CN 110; see col. 4, line 33-42; see col. 33, line 14 to col. 34, line 55) by the Home Agent of the router (see FIG. 2, by home agent functionality of the router 150; see FIG. 14, by the home agent functionality of the router R7; or see FIG. 17, by the router R7 or home agent functionality of the root router 360); and

forwarding a packet (see FIG. 6, processor 266 and memory 268 of a router in the domain performs routing/forwarding IP packet; see col. 11, line 58 to col. 12, line 6) by the Home Agent of the router (see FIG. 2, by home agent functionality of the router 150; see FIG. 14, by the home agent functionality of the router R7; or see FIG. 17, by the router R7 or home agent functionality of the root router 360) to the Foreign Agent of the router (see FIG. 2, to the foreign agent fundability of the router 150; see FIG. 14, to foreign functionality of the router R7; or see FIG. 17, to the router R8, or foreign agent functionality of the root router 360) via a physical interface on the router (see FIG. 14, via interface Intf A/B at R7, or root router 360; see FIG. 17,



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via interface Intf B/A at R7/R8, or root router 360 Intf B/C; see col. 23, line 41 to col. 24, line 29; see col. 25, line 20 to col. 27, line 25; see col. 27, line 45 to col. 30, line 65);

wherein the packet received from the corresponding node (see FIG. 2, 14, 17, the packet received from CN; see col. 4, line 33-42; see col. 33, line 14 to col. 34, line 55) does not identify the physical interface (see FIG. 14, 17, does not indicate/identify the interface Intf on the R7/R8/root router 360; see col. 23, line 41 to col. 24, line 29; col. 25, line 20 to col. 27, line 25; see col. 27, line 45 to col. 30, line 65; also see FIG. 19, see col. 33, line 14 to col. 34, line 55).

La Porta does not explicitly disclose “advertising” and “advertised by the router”.

However, Yuan teaches a foreign agent advertising a foreign agent address (see page 2, paragraph 21; foreign agent advertise its foreign agent (FA) care of address) and the registration request packet (see FIG. 5, registration packet) specifying a Home Address (see FIG. 5, Home address) and a care-of address (see FIG. 5, care-of-address (FA address)), wherein the Home Address specified in the registration request packet is used to identify the Home Agent address associated with the router (see FIG. 3, 5, home address in the registration packet is home agent address which is associated with the router 72) and the care-of address specified in the registration request packet is equivalent to the Foreign Agent address advertised by the router (see FIG. 5, a care of address in the registration packet is the same as FA address); see page 2, paragraph 18-21; see page 3, paragraph 23-26.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide “advertising” and “advertised by the router” as taught by Yuan in the system of La Porta, so that it would support mobile data device that are relocatable

within an IP network such that mobile data device can be connected to different subnetwork of the IP network as suggested by Yuan, see Yuan page 2, paragraph 17.

**Regarding Claim 33**, La Porta discloses wherein registering the mobile node includes: updating a routing table (see FIG. 6, routing table in the memory 268; see col. 12, line 5-10) with a physical interface on the router (see FIG. 14, interface Intf C on router R7; see FIG. 17, interface Intf B on router R8, or Intf C on root router 360) to enable the router to forward a packet to the mobile node via the physical interface (see FIG. 14, refreshing/updating routing table in domain router R7 to enable the router forward the packet to MD 114 via Intf C; see col. 24, line 5-29; or see FIG. 17, refreshing/updating routing table in domain router R8 to enable the router forward the packet to MD 114 via Intf B, or refreshing/updating routing table in domain router root router 360 to enable the router forward the packet to MD 114 via Intf C; see col. 28, line 22 to col. 29, line 5).

**Regarding Claim 35**, La Porta discloses registering the mobile node includes: updating a mobility binding table of the Home Agent (see FIG. 6, routing table in the memory 268 with binding; see col. 5, line 50-67; see col. 12, line 5-10) with a care-of address associated with the mobile node (see FIG. 7, 9, with source IP address 316 which is a care of address (e.g. foreign agent address) associated with mobile node; see col. 2, line 4-10, 17-30; see col. 5, line 5-15; see col. 7, line 1-20; see col. 8, line 10-45, 64 to col. 7, line 10; see col. 10, line 10-20; see col. 14, line 25-67; see col. 15, line 20-35 ) and a physical interface associated with the mobile node (see FIG. 14, interface Intf C on router R7; see FIG. 17, interface Intf B on router R8, or Intf C on root router 360 associated with MD 114) to indicate that the mobile node has registered with the Home Agent via the care-of address, the physical interface being an interface on the router (see

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FIG. 14, refreshing/updating binding routing table in domain router R7 to indicate that MD 114 is setup/established with home agent via a source care of address of R7, where Intf C is on the R7; see col. 24, line 5-29; or see FIG. 17, refreshing/updating binding routing table in domain router R8 to indicate that MD 114 is setup/established with home agent via a source care of address of R8, where Intf B is on the R8, or refreshing/updating binding routing table in domain root router 360 to indicate that MD 114 is setup/established with home agent via a source care of address of domain root router 360, where Intf C is on the domain root router 360; see col. 28, line 22 to col. 29, line 5).

12. Claims 34, 36, 37, 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over La Porta (US006434134B1) in view of Yuan (US2001/0041571) and Ahmed.

**Regarding Claim 34**, La Porta discloses wherein updating the routing table is performed to reach the mobile node as set forth above in claims 32 and 33.

Neither La Porta nor Yuan explicitly disclose “without creating a tunnel interface”.

However, How Ahmed teaches wherein updating the routing table is performed without creating a tunnel interface to reach the mobile node (see col. 13, line 5 to col. 14, line 55; in home and visitor location registration, each mobile station is assigned a HLR, which includes mobile host name, unique ID, SNLA, time of entry and expiration time. Each network node maintains a VLR that records information on mobiles that are within its coverage area and have registered and updated with it, thus it is clear that updating is performed without a tunnel interface).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide “without creating a tunnel interface” as taught by Ahmed in the combined system of La Porta and Yuan, so that it would provide efficient, scaleable and flexible communications system capable of handling various application in mobility management techniques as suggested by Ahmed; see col. 3, line 35-50.

**Regarding Claim 36**, La Porta discloses wherein updating the mobility binding routing table is performed to reach the mobile node as set forth above in claims 32 and 35.

Neither La Porta nor Yuan explicitly disclose “without creating a tunnel interface”.

However, How Ahmed teaches wherein updating the mobility binding routing table is performed without creating a tunnel interface to reach the mobile node (see col. 13, line 5 to col. 14, line 55; in home and visitor location registration, each mobile station is assigned a HLR, which includes mobile host name, unique ID, SNLA, time of entry and expiration time. Each network node maintains a VLR that records information on mobiles that are within its coverage area and have registered and updated with it, thus it is clear that updating is performed without a tunnel interface).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide “without creating a tunnel interface” as taught by Ahmed in the combined system of La Porta and Yuan, so that it would provide efficient, scaleable and flexible communications system capable of handling various application in mobility management techniques as suggested by Ahmed; see col. 3, line 35-50.

**Regarding Claim 37**, La Porta discloses wherein registering the mobile node includes updating a table of the Foreign Agent (see FIG. 6, refreshing/updating routing table in the

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memory 268 of the foreign agent router R7 (see FIG. 15), or R8/ root router 360 (see FIG. 17); see col. 12, line 5-10) to include an address of the mobile node (see FIG. 6, to add/include mobile network address 314) to indicate that the mobile node is being serviced by the Foreign Agent (see FIG. 15, 17, to show/indicate that MD 114 is handoff and serviced by foreign agent router R7 (see FIG. 15), or R8/ root router 360 (see FIG. 17)) and an associated physical interface on the router to reach the Home Agent (see FIG. 14, interface Intf C on router R7; see FIG. 17, interface Intf B on router R8, or Intf C on root router 360 associated to the mobile node to forward/route to home agent R7 (see FIG. 14), or R7/root-router 360 (see FIG. 17); see col. 24, line 5-29; see col. 28, line 22 to col. 29, line 5) .

Neither La Porta nor Yuan explicitly disclose “visitor” and “without creating or specifying a tunnel interface”.

However, Ahmed teaches visitor table (see col. 13, line 1-30; visitor location register/table), and wherein registering the mobile node is performed without creating a tunnel interface to reach the home agent (see col. 13, line 5 to col. 14, line 55; in home and visitor location registration, each mobile station is assigned a HLR, which includes mobile host name, unique ID, SNLA, time of entry and expiration time. Each network node maintains a VLR that records information on mobiles that are within its coverage area and have registered with it, thus it is clear that registration is performed without a tunnel interface).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide “visitor” and “without creating a tunnel interface” as taught by Ahmed in the system of La Porta, so that it would provide efficient, scaleable and flexible

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communications system capable of handling various application in mobility management techniques as suggested by Ahmed; see col. 3, line 35-50.

**Regarding Claim 39**, La Porta discloses wherein forwarding the mobile node is performed to reach the mobile node as set forth above in claim 32.

Neither La Porta nor Yuan explicitly disclose “without encapsulating or tunneling the packet”.

However, How Ahmed teaches wherein forwarding the mobile node is performed without encapsulating or tunneling the packet (see col. 13, line 5 to col. 14, line 55; in home and visitor location registration, each mobile station is assigned a HLR, which includes mobile host name, unique ID, SNLA, time of entry and expiration time. Each network node maintains a VLR that records information on mobiles that are within its coverage area and have registered and forwarded/routed with it. Thus it is clear that forwarding is performed without a tunnel interface, and since there is no tunnel interface, the packets are not encapsulated for tunneling).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide “without encapsulating or tunneling the packet” as taught by Ahmed in the combined system of La Porta and Yuan, so that it would provide efficient, scaleable and flexible communications system capable of handling various application in mobility management techniques as suggested by Ahmed; see col. 3, line 35-50.

**Regarding Claim 40**, La Porta discloses wherein forwarding the mobile node is performed as set forth above in claim 32.

Neither La Porta nor Yuan explicitly disclose “without creating a tunnel interface”.

However, How Ahmed teaches wherein forwarding the mobile node is performed without creating a tunnel interface (see col. 13, line 5 to col. 14, line 55; in home and visitor location registration, each mobile station is assigned a HLR, which includes mobile host name, unique ID, SNLA, time of entry and expiration time. Each network node maintains a VLR that records information on mobiles that are within its coverage area and have registered and forwarded/routed with it. Thus it is clear that forwarding is performed without a tunnel interface).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide “without creating a tunnel interface” as taught by Ahmed in the combined system of La Porta and Yuan, so that it would provide efficient, scaleable and flexible communications system capable of handling various application in mobility management techniques as suggested by Ahmed; see col. 3, line 35-50.

### ***Response to Arguments***

13. Applicant's arguments with respect to **claims 26-37, 39-40, and 44-57** have been considered but are moot in view of the new ground(s) of rejection.

**Regarding claims 26-37, 39-40, 44-57, the applicant argued that,** “...examiner admits that “La Porta fails to explicitly teach of disclosing a binding table.....within a router...” in page 17.

**In response to applicant's argument,** new grounds of rejection is made with the new interpretation of La Porta reference, and thus any rejection or admission made prior to this office is hereby considered moot.

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**Regarding claims 26-37 and 39-40, 44-57, the applicant argued that,** "...Ahmed fails to disclose or suggest intra-agent mobility....Home agent and foreign agent functionality within a single router to support intra agent mobility where a home agent forwards a packet that is not addressed to a particular interface to forward to a foreign agent via a particular physical interface...neither of the cited references disclose or suggest specifying a physical interface rather than the conventional tunnel interface in a mobility binding table, a visitor table or routing table, where the physical interface is not a part of an address...La Porta fails to disclose or suggest the specification of a physical interface on a router to support intra-agent mobility within the router ..." in page 18-20.

**In response to applicant's argument, the examiner respectfully disagrees** with the augment above.

First, applicant claims are indefinite as set forth above in U.S.C. 112, 2<sup>nd</sup> rejection in paragraph 7. Second, neither applicant specification nor drawing even show how home agent and foreign agent are connected by a physical port. Per FIG. 1, home agent 8 and foreign agent 10 are two separate entities. Per FIG. 2, router includes **"HA/FA"** (i.e. HA **or** FA), **not HA and FA as argued by the applicant.** Clearly, home agent and foreign agent may or may not be on the same router. Thus, applicant argument that Home agent and foreign agent functionality within a single router is irrelevant.

Ahmed is not required to disclose or suggest intra-agent mobility since La Porta clearly discloses the intra-agent mobility where home and foreign functionality are within a single domain router as set forth in new grounds of rejection above.



In particular, La Porta discloses forwarding a packet (see FIG. 6, processor 266 and memory 268 of a router in the domain performs routing/forwarding IP packet; see col. 11, line 58 to col. 12, line 6) by the Home Agent of the router (see FIG. 2, by home agent functionality of the router 150; see FIG. 14, by the home agent functionality of the router R7; or see FIG. 17, by the router R7 or home agent functionality of the root router 360) to the Foreign Agent of the router (see FIG. 2, to the foreign agent fundability of the router 150; see FIG. 14, to foreign functionality of the router R7; or see FIG. 17, to the router R8, or foreign agent functionality of the root router 360) via a physical interface on the router (see FIG. 14, via interface Intf A/B at R7, or root router 360; see FIG. 17, via interface Intf B/A at R7/R8, or root router 360 Intf B/C; see col. 23, line 41 to col. 24, line 29; see col. 25, line 20 to col. 27, line 25; see col. 27, line 45 to col. 30, line 65);

La Porta further discloses wherein the packet received from the corresponding node (see FIG. 2, 14, 17, the packet received from CN; see col. 4, line 33-42; see col. 33, line 14 to col. 34, line 55) does not identify the physical interface (see FIG. 14, 17, does not indicate/identify the interface Intf on the R7/R8/root router 360; see col. 23, line 41 to col. 24, line 29; col. 25, line 20 to col. 27, line 25; see col. 27, line 45 to col. 30, line 65; also see FIG. 19, see col. 33, line 14 to col. 34, line 55).

Thus, it is clear that the combined system of La Porta and Ahmed, as well as a combined system of La Porta and Yuan discloses all claimed invention.

**Regarding claims 26-37 and 39-40, 44-57, the applicant argued that, "...La Porta teaches away from the claimed invention, which requires the packet to be intercepted by the home agent as claimed...Ahmed teaches away from enabling packets to be directed to a physical**

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interface without identifying the interface in the packet...Thus prior art teaches away from a home agent of a router forwarding packets to a foreign agent of the router by transmitting those packets to a physical interface..." in page 17-21.

**In response to applicant's argument, the examiner respectfully disagrees** with the argument.

La Porta clearly discloses determining registration request packet at the home agent as set forth above in new ground of rejection. La Porta also discloses enabling packets to be directed to a physical interface without identifying the interface in the packet as set forth above in new ground of rejection.

In particular, La Porta discloses forwarding a packet by the Home Agent of the router to the Foreign Agent of the router via a physical interface on the router (see FIG. 4, network node 104 includes HLR, VLR, and home directory table; thus the physical interface of the network node 104 enables packets addressed to the home address of the mobile 102 to forward to the VLR via the physical interface identified for the network node 104; see col. 11, line 42-67).

Thus, since the combined system of La Porta and Ahmed clearly teaches applicant's broadly claimed invention, it is clear that La Porta or Ahmed does not teach away.

### ***Conclusion***

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to IAN N. MOORE whose telephone number is (571)272-3085. The examiner can normally be reached on 9:00 AM- 6:00 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Trost can be reached on 571-272-7872. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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